Monarch
Marking Systems

Monarch 9400™ Series Thermal Printer

Programmer's Manual

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CAUTION

This equipment can interfere with radio communication. The equipment complies with limits for a Class A computing device pursuant to FCC Rules, Subpart J, Part 15, which provide reasonable protection against such interference when operated in a commercial environment. Operation in a residential area can cause interference which the user must correct at his own expense.

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

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1. Introduction

This manual tells you how to enter online formats and batch data for downloading to Monarch 9400™ series printers.

The following printers are covered by this manual.

- 9425
- 9445
- 9465
- 9474

Other manuals you may need are

Equipment Manual	Contains general setup and maintenance procedures.
Operator's Handbook	Explains data entry and batch control for offline printing.
User's Manual	Tells about creating and entering offline formats.

To get the best performance from your printer, read the documents that tell you how to use it. If you have any questions or problems you can't solve, we'll be glad to help.

2. Overview

The 9400 Series Thermal Printer can receive print data online from a host computer. During online communication, the host computer treats the printer as an RS-232 type printer. For the printer to communicate online, you will need an RS-232 cable. For mainframe communication, you may need a protocol converter.

To transmit data from the host computer requires communication controls for the download operation. Refer to the next section, "Communication Requirements."

Three types of data can be transmitted:

Format data The user-designed layout for online formats. These formats are used by online batches for printing.

NOTE: These online formats can also be used offline. However, formats created offline cannot be used online.

Batch data Contains the format number and actual data to be printed on the supply. Batch data is downloaded to the printer and combined with a format stored in the printer.

Graphic data Contains the actual pixel data which forms a graphic image.

NOTE: Format, batch, and graphic data are stored when you turn the power off.

Format and graphic data may be sent at any time.

Since batch data is combined with a format for printing, the format and graphic data for a batch must reside in the printer before sending the batch.

Each data type has its own data stream structure. Refer to "Message Structures" in this manual.

3. Communication Requirements

To enable communications between the printer and the computer, the printer communications setup must match the setup for the host computer. The options are:

- Baud rate
- Parity
- Data flow control
- Data bits
- Stop bits

All online data uses the ASCII (American Standard Code for Information Interchange) character code for interpretation of bits as characters.

Input Characteristics

Below are the input characteristics for communications. The defaults are shown in bold print.

- Asynchronous
- Full duplex
- Selectable options:

Baud rate	110, 300, 600, 1200, **2400**, 4800, 9600
Parity	**No parity**, Odd, Even
Data flow	**Xon/Xoff**, Data Terminal Ready (DTR)
Data bits	Seven (7) or **eight (8)**
Stop bits	**One (1)** or two (2)

Modify these communication settings on your printer as necessary to match the settings on your host computer. See "Setting Communication Values" in this chapter.

There are three main buffers: batch, format, and graphic. The printer also has a 1024 byte input buffer which holds data until it is processed into the respective buffer(s).

Data Flow Control

The printer uses Xon/Xoff or data terminal ready (DTR) for data flow control. DTR flow control is usually required if you are using an IBM-PC, unless the PC has a special Xon-Xoff program.

In DTR mode, the printer activates DTR when the printer can accept more data from the host and deactivates when the printer's receive buffer is nearly full. In Xon/Xoff Mode, the printer sends the Xon character when the printer can accept more data and sends Xoff when the printer buffer is nearly full.

In either mode, once the printer has indicated that its buffer is nearly full (by sending Xoff or deactivating DTR), up to 134 additional characters may be accepted without losing any data.

The printer does not require any hardware or software signals from the host system in order to operate.

NOTE: Flow control characters can be changed offline through the Printer Configuration mode.

The total number of formats, batches, and graphics is only limited by the amount of memory available.

Setting Communication Values

To set the communication parameters, follow the instructions below. For more information on operating the printer, refer to the *Operator's Handbook*.

1. From the main menu, press ↓ to display Printer Configuration. Press ⏎ . You'll see

```
Enter password: _ _ _ _ _ _ _ _
```

Enter the 1-8 character password and press ⏎ .

NOTE: When you first receive the printer, the password is MANAGER or ONLINE.

2. You'll see the Configuration Options menu.

```
Select Config Option:
Define Check Digit Schemes
```

Press ↓ until you see Host Port Configuration. Press ⏎ to select this option. With each parameter, you can enter a new selection, or just press ⏎ to keep the value that is displayed.

3. You'll see the Host Option menu and the first online parameter.

```
Select Baud Rate:
2400
```

Press ↓ or ↑ until you see the baud rate you need, then press ⏎ . You'll see

```
Enter Parity: N
N)one, O)dd or E)ven
```

4. Select the parity you need and press ⏎ . You'll see

```
Enter Word Length [7-8]: 8
```

5. Select the word length you need and press ⏎ . You'll see

```
Enter Stop Bits [1-2]: 1
```

6. Select the stop bits you need and press ⏎ . You'll see

```
Enter Start (XON) character:
17
```

7. Enter a number from 1-127 for XON flow control, or 128 for DTR flow control. You'll see

```
Enter Stop (XOFF) character:
19
```

8. Enter a number from 1-127 for XOFF flow control, or 128 for DTR flow control.

NOTES:

- If you select DTR control (128) as the XON character, the printer will automatically set 128 (DTR control) for the XOFF character.
- The Start and Stop characters must be set at 128 (DTR flow control) for IBM PC equipment.

You'll see the Configuration Options menu.

Press F1 to exit to the main menu.

Cable Interface

The printer accepts standard RS-232C electrical signal transmissions when it is connected to a DB-25S connector configured as Data Terminal Equipment (DTE). For correct operation, use all defined pins.

PC null modems

Plug the RS-232 cable into:

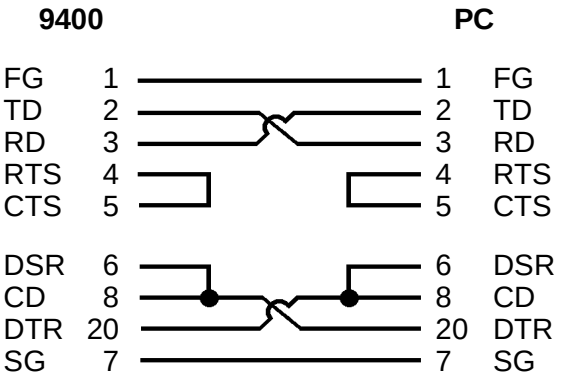
- A serial (RS-232) port on your host computer or protocol converter
- The 25-pin RS-232 connector on your printer. See "Installing the Printer" in your *Equipment Manual*.

The RS-232C cable interface is set up as a terminal device (DTE):

Pin	Description	
3	Received Data	
5	Clear to Send	Input
6	Data Set Ready	
2	Transmitted data	
4	Request to send	Output
20	Data Terminal Ready	
1	Protective ground	Ground
7	Signal ground	

All other pins are open.

The cable interface for PC null modems is shown below.



4. Message Structures

This chapter has information and message structures for

- Formats
- Batch Data

Graphic image data is discussed in Chapter 5.

Creating Online Data Streams

Create data streams for your 9400 series printer using a standard text editor, such as EDLIN or TSO.

If you use a word processor to create data streams, make sure to save the file in text-only or unformatted mode.

Transmitting Online Data Streams

Your printer must be in Online Mode before it will accept data from your computer.

- Select Online from the Select Operating Mode menu.
- Press . You'll see

Online Mode Ready:

Your printer is now ready to accept data.

Send data to the printer just as you would send any print data to a printer from your computer.

For example, if you have a file named FORMAT1.DAT on an MS-DOS system, you could send the data to your printer with these commands:

```
MODE COM1:2400,N,8,1,P
MODE LPT1:=COM1
PRINT FORMAT1.DAT
```

This set of commands would send the file FORMAT1.DAT to a printer connected to COM1 of an MS-DOS computer.

Format and graphic structures can be sent at any time.

Formats or graphics used by batch data must be sent before the batch data referencing them. Any batch sent without a previously defined format is ignored, generating an error.

NOTE: Formats designed on the 9425, 9445, or 9474 printers **using the Dots numbering system** will not have the same horizontal field locations when used on the 9465 printer. You will have to adjust the format as needed.

Error Notification

Data handling and error checking are resident in the printer. If an error in transmission occurs, an error is displayed on the printer keypad display. However, no message is sent to the host computer and processing continues until the end of the transmission.

Certain errors may put the printer in offline mode. See the *Messages Manual* for a list of possible messages.

Data Transmission Errors

The printer displays errors that occur during data transmission. Printer fault errors stop the machine, which will not resume printing until the operator corrects the error condition. All these messages take the system offline.

Incorrect Data Errors

The printer pauses when it receives incorrect data from the host computer. During the pause, it displays a message and beeps. After ten seconds, or when the operator presses ⏎ , the printer resumes operation. Normally, the printer loses the data that caused the error.

If the host or the communications line goes down during transmission, the printer displays the message

```
Waiting for command terminator.
Press F1 to abort download.
```

If you press F1 , the batch or format data that was being sent will be lost and must be retransmitted.

Monetary Symbols

The default monetary symbols are the U.S. dollar and cents. The ASCII characters $ (24 hex) and ^ (5E hex) represent the dollar and cent symbols.

If you change your printer settings to use international pricing symbols, these characters will then represent the new symbols. For monetary selections that don't have a cent equivalent, the ^ character is changed to a space.

NOTE: In EBCDIC-based systems a ^ is not available. Use ~94 to print a cent sign.

Commands

The following characters are used in 9400 series online data streams.

Command Characters

Command Character	Hex Value	Description
{	7B	Open brace. Command LEADIN character
,	2C	Comma. Inter-field separator (IFS)
;	3B	Semicolon. Beginning of string character
¦	7C	Split vertical bar. Command inter-record separator (IRS)
}	7D	Close brace. Command TERMINATOR character

Programming Conventions

All online commands from the host computer follow these rules.

- All data after the TERMINATOR character (}) and before the next LEADIN character ({) is ignored.
- The hex values 7B, 7C and 7D are reserved as command delimiters. All data of a value less than 20 hex and greater than 7E hex is ignored.
- All data strings (batch data, compressed bit-map images or format data) begin with a semi-colon (3BH) and end with a TERMINATOR or inter-record separator (IRS or ¦ (7C hex)).
- All space characters, except string definitions, are ignored.
- All strings must be less than 100 characters.

Format Data

Format data contains the following.

- Format identification number and name
- Supply size
- Online field definitions for text, bar code, line and graphic fields

The following offline format elements are not supported online.

- Merged fields
- Time or date fields
- Fixed characters
- Fixed or variable length
- Sub-fields
- User-defined check digits
- Alphanumeric distinction
- Price fields

You must supply these elements if you need them in your program.

The message structure used to transmit online format data is shown below, followed by an example.

```
{      FORMAT ID, LENGTH, WIDTH; FORMAT_NAME ¦
       TEXT FIELD, INCREMENT FLAG, INCREMENT VALUE, ROW,
             COLUMN, MULTIPLE, TEXT FONT,
             CHARACTER ROTATION, FIELD ROTATION, COLOR  ¦
       BARCODE FIELD, INCREMENT FLAG, INCREMENT VALUE,
             ROW, COLUMN, DENSITY,BAR CODE FONT,
             FIELD ROTATION, HEIGHT, READABLE CHARACTERS ¦
       LINE FIELD, ROW, COLUMN, DIRECTION, STOP,
             THICKNESS ¦
       GRAPHIC FIELD, ROW, COLUMN ¦
       .
       .
}
```

Example

This example has three text fields and one bar code field.

```
{      F1,0558,0507;ONLINE ¦
             T00,I,000,0475,0050,1,1,0,0,B ¦
             T01,I,000,0406,0050,1,1,0,0,B ¦
             T02,I,000,0017,0253,1,1,0,0,B ¦
             B00,I,000,0124,0093,1,1,0,0177,1 ¦
             }
```

The format header record (beginning with the Format ID) must always be the first record in a format data stream.

NOTE: Spaces can be used in the data stream. However, if used in a string following a semi-colon, they will be treated as printable characters.

Format Header Record

The format header record is constructed as shown below.

Syntax

```
{F##,LENGTH,WIDTH;FORMAT NAME ¦
```

Field	Contents
F##	Must begin with the letter **"F"** to represent the beginning of a format data stream. The F is followed by a one or two digit number as the format ID Values: **0-99** Example: **F23** = Format number 23
LENGTH	One to four digits to define the supply length in tenths of millimeters. Values: **191-2032** (19.1 to 203.2 mm or 0.75 to 8.0 inches) Examples: **200** = 20mm **201** = 20.1mm

`WIDTH` One to four digits to define the width of the supply in tenths of millimeters (across the printhead).

Values:

9425	191-634 (0.75 to 2.5 inches)
9445	191-1078 (0.75 to 4.25 inches)
9465	191-1078 (0.75 to 4.25 inches)
9474	191-1078 (0.75 to 4.25 inches)

`;FORMAT_NAME` One to eight-character name assigned by the user. It can contain any ASCII alphanumeric character, including slash (/), hyphen (-), space ( ), dollar sign ($), or decimal point (.).

Note that since the Format Name is a character string, it is preceded by a semicolon (;).

Example

```
{F23, 500, 200;TEXTILES ¦
```

This format has the following attributes:

- Format number is F23.
- Supply length is 50 millimeters.
- Supply width is 20 millimeters.
- This format is named "TEXTILES."

Syntax Checklist

- Make sure this is the first record in your format.
- Make sure the record begins with {.
- Make sure the first parameter (format number) begins with F.
- Make sure the length and width in this record matches your supply length and width. Remember, these numbers are in tenths of millimeters, so 500 equals 50 millimeters or 5 centimeters.

- Make sure your format name begins with a semi-colon (;).
- Make sure the record ends with a record separator (¦).

Text Field Record

The text field record is constructed as shown below.

Syntax

```
T##,IFLAG,IVALUE,ROW,COL,MAG,TFONT,C-ROT,F-ROT,COLOR
```

Field

Contents

`T##` Must begin with the letter 'T' for a text field.

The T is followed by one or two digits for the field number. There can be up to 100 fields per format, in any combination of text, barcode, line, or graphic fields.

Values: **0-99**

`IFLAG` You can set numeric fields to increase or decrease in value as each ticket is printed.

This parameter consists of one character to define the field as incremented, decremented, or constant.

Values: **I** = Increment
D = Decrement

If the field does not change, define IFLAG as 'I' and set IVALUE to zero (0).

NOTE: Do not select incrementing on fields that contain a check digit.

`IVALUE` One to three digits to define the amount by which the value in the field increases or decreases as each ticket is printed. If the field does not change, define IFLAG as 'I' and set IVALUE to zero (0).

Values: **0-999**

ROW

One to four digits to define the row location of the field on the supply. This is the distance from the the guide edge zero point at the *bottom* of the supply and the bottom of the field.

The zero point is 1.5 mm or 0.060 inches from the bottom of the supply. The bottom of the supply is the edge that exits the printer first.

This value is measured in tenths of millimeters (TOMMS) and must be less than the maximum length of the supply.

Values: **0-2032**

COL

One to four digits to define the column location of the field on the supply. This is the distance from the guide edge zero point at the *left* edge of the supply and the left edge of the field.

The zero point is 1.5 mm or 0.060 inches from the left edge of the supply.

The unit of measurement is tenths of millimeters. The range must be less than the maximum width of the supply.

Values:

9425	0-508 (0 to 2 inches)
9445	0-1016 (0 to 4 inches)
9465	0-1016 (0 to 4 inches)
9474	0-1016 (0 to 4 inches)

`MAG` One to two digits as the magnification factor for the font of text fields.

Values: **1 - 10**

NOTE: Font magnifications creating greater than 30% black print on a format may result in lower print quality.

`TFONT` One digit as the font for the TEXT field. See "Quick References" for font samples.

Values:

1 Standard
2 Reduced
3 Bold
5 OCR-A
6 UPC HR1
7 UPC HR2

`C-ROT` Character rotation. The direction characters point with respect to the field.

Values:
0 = tops of characters toward top of field
1 = tops of characters toward left of field

`F-ROT` Field rotation. The direction of the field with respect to the supply.

Values:
0 = top of field toward top of supply
1 = top of field toward left of supply
2 = top of field toward bottom of supply
3 = top of field toward right of supply

`COLOR` One character to define the color of a text field.

Values:

B = Black characters (42H)
W = White characters on black (57H)

Example

```
T05,I,0,230,30,1,1,0,0,B ¦
```

This text field has the following attributes:

- Text field number is **T05**.
- This field does not change value with successive tickets (IFLAG = **I**, increment value = **0**).
- Field begins **23** millimeters from the bottom of the print area.
- Field begins **3** millimeters from the left edge of the print area.
- The font appears at normal size (magnification = **1**)
- Standard font is used (**1**).
- Tops of characters point to the top of the field (character rotation = **0**).
- The top of the field points to the top of the supply (rotation = **0**).
- Characters appear in **B**lack.

Syntax Checklist

- Make sure this record is preceded by a format header record.
- Make sure the first parameter (field number) begins with T.
- Make sure the row and column locations in this record are less than the supply length and width.
- Make sure you have allowed enough space to hold all the characters in the field without running off the supply.
- Make sure the record ends with a record separator (¦).
- If this is the last record in your format, place a close brace (}) at the end of the record.

Bar Code Field Record

The bar code field record is constructed as shown below.

Syntax

```
B##,IFLAG,IVALUE,ROW,COL,DENSITY,BFONT,F-ROT,HEIGHT,HR ¦
```

Field	Contents
BARCODE	Must be the letter 'B' for a bar code field. The B is followed by one or two digits for the field number. There can be up to 100 fields per format, in any combination of text, barcode, line, or graphic fields. Values: **0-99**
IFLAG	You can set numeric fields to increase or decrease in value as each ticket is printed. This parameter consists of one character to define the field as incremented, decremented, or constant. Values: **I** = Increment **D** = Decrement If the field does not change, define IFLAG as 'I' and set IVALUE to zero (0). **NOTE:** Do not select incrementing on UPC or EAN bar codes or fields that contain a check digit.
IVALUE	One to three digits to define the amount by which the value in the field increases or decreases as each ticket is printed. If the field does not change, define IFLAG as 'I' and set IVALUE to zero (0). Values: **0-999**

ROW

One to four digits to define the row location of the field on the supply. This is the distance from the the guide edge zero point at the *bottom* of the supply and the bottom of the field.

The zero point is 1.5 mm or 0.060 inches from the bottom of the supply. The bottom of the supply is the edge that exits the printer first.

This value is measured in tenths of millimeters (TOMMS) and must be less than the maximum length of the supply.

Values: **0-2032**

NOTE: The minimum row location for serial bar code fields is

9425	16 (0.06 inches)
9445	16 (0.06 inches)
9465	16 (0.06 inches)
9474	23 (0.09 inches)

COL

One to four digits to define the column location of the field on the supply. This is the distance from the guide edge zero point at the *left* edge of the supply and the left edge of the field.

The zero point is 1.5 mm or 0.060 inches from the left edge of the supply.

The unit of measurement is tenths of millimeters. The range must be less than the maximum width of the supply.

Values:

9425	0-508 (0 to 2 inches)
9445	0-1016 (0 to 4 inches)
9465	0-1016 (0 to 4 inches)
9474	0-1016 (0 to 4 inches)

`DENSITY` One digit for the bar code density for Interleaved 2 of 5, Code 128, MSI, Code 39, and UPC/EAN barcodes.

Values: **1-5**

Some bar codes do not support all 5 values.

For the actual densities for these values, see "Quick References."

`BFONT` One digit indicating which bar code font to use.

Values:

1	UPC-A
2	UPC-E
3	Interleaved 2 of 5
4	Code 39
5	Codabar
6	EAN-8
7	EAN-13
8	Code 128
9	MSI
10	UPC/EAN+2
11	UPC/EAN+5

`F-ROT` Field rotation. The direction of the field with respect to the supply.

Values:
0 = top of field toward top of supply
1 = top of field toward left of supply
2 = top of field toward bottom of supply
3 = top of field toward right of supply

`HEIGHT` One to four digits for the bar code height in tenths of millimeters. The value should be less than the length or width of the supply.

Values: **50-2032** (5.1 to 203.2 mm or 0.2 to 8.0 inches)

HR

(Human readable characters) One digit for the location of human readable characters printed with a UPC or EAN bar code. If no value is given, no human readable characters are printed.

Values:
0 = No human readable characters printed
1 = Human readable printed above the bar code
2 = Human readable printed below the bar code

NOTE: Always use the HR parameter to generate the human readable text for a UPC or EAN bar code. If you manually insert human readable text, the barcode may not print accurately.

Example

```
B11,I,1,70,30,1,4,0,120,0
```

This bar code field has the following attributes:

- Bar code field number is **B11**.
- This field increases by **1** with successive tickets (IFLAG = **I**, increment value = **1**).
- Field begins **7** millimeters from the bottom of the print area.
- Field begins **3** millimeters from the left edge of the print area.
- Bar code density is 6.63 characters per inch (density = **1**, code 39)
- Bar code used is Code 39 (**4**).
- The top of the field points to the top of the supply (rotation = **0**).
- The height of the bar code is **12** millimeters.

- No human readable characters appear with this bar code (**0**).

Syntax Checklist

- Make sure this record is preceded by a format header record.
- Make sure the first parameter (field number) begins with B.
- Make sure the row and column locations in this record are less than the supply length and width.
- Make sure you have allowed enough space to hold all the characters in the field without running off the supply.
- Make sure you have left enough room so the bar code height does not run off the supply.
- Make sure the record ends with a record separator (¦).
- If this is the last record in your format, place a close brace (}) at the end of the record.

NOTES:

1. Field definitions may be sent in any order, regardless of field location. The last field carries priority over previous fields and will overwrite the previous fields if they overlap when printed.

2. To print human readable characters for Code 39, Interleaved 2 of 5, Codabar, Code 128 and MSI bar codes, create a separate text field.

   NOTE: If using this method with UPC or EAN bar codes, the bar code may not print correctly.

3. A new format with the same ID number as a previously defined format will overwrite the old format. However, the old format will not be overwritten until all batches queued to use the old format are completed.

4. The following special restrictions apply to online bar codes.

UPCA You must send a leading zero, 11 digits of data and a check digit (13 digits total).

UPCE The printer automatically prints a leading zero for this bar code. You must send data and a check digit (7 digits total).

EAN13 You must send 12 digits of data and a check digit (13 digits total).

EAN8 You must send 7 digits of data and a check digit (8 digits total).

NOTE: If the check digit is incorrect or omitted from a UPC or EAN bar code, the printer will automatically place the correct check digit in the bar code.

I 2 of 5 This bar code has no check digit. The printer automatically prints the start and stop characters, so only the data must be sent. The length of the data is variable. If the data has an odd number of digits, add a leading zero to make the length even.

Code 39 The start and stop characters must be placed at the beginning and end of the data before it is sent to the printer. The start and stop character is an asterisk (*). The length of the data is variable.

Codabar The start and stop characters must be placed at the beginning and end of the data before it is sent to the printer. The acceptable start and stop characters are a combination of lowercase a, b, c, or d. The length of this data is variable.

Code 128 You can send characters for Function Codes 1-4 as

- fixed data when defining a code 128 field

- batch data when printing.

To send the Function Codes, use a tilde (~) followed by a three digit ASCII code as shown in the following table.

For example, to print a string of bar code data with function code **F2** as the fourth character...

123(F2)5678

send this string of characters...

123~1295678

ASCII Code	Function Code
~134	F1
~129	F2
~128	F3
~132	F4

Two additional bar codes are supported as extensions to both UPC and EAN bar codes.

+2 Send exactly two digits for this bar code.

+5 Send exactly six digits (a five-digit bar code and a one-digit check digit).

Line Field

The message structure below transmits a line field. This data stream defines the bit map to form a graphic line field. Use the line field to emphasize data by printing a line or box.

You can have up to 100 line images. The line record can be placed in a format data stream anywhere following the format header record.

Syntax

```
L##, ROW, COLUMN, DIRECTION, STOP, THICKNESS ¦
```

NOTE: Lines are counted as fields, just like text or bar code fields. When determining the number of fields in your format, count each line as a separate field.

Field	Contents
`L##`	Must begin with the letter "L" for a line field. The L is followed by one or two digits for the field number. There can be up to 100 fields per format, in any combination of text, barcode, line, or graphic fields. Values: **0-99**
`ROW`	One to four digits to define the row location of the field on the supply. This is the distance from the the guide edge zero point at the *bottom* of the supply and the bottom of the field. The zero point is 1.5 mm or 0.060 inches from the bottom of the supply. The bottom of the supply is the edge that exits the printer first. This value is measured in tenths of millimeters (TOMMS) and must be less than the maximum length of the supply. Values: **0-2032**

`COLUMN` One to four digits to define the column location of the field on the supply. This is the distance from the guide edge zero point at the *left* edge of the supply and the left edge of the field.

The zero point is 1.5 mm or 0.060 inches from the left edge of the supply.

The unit of measurement is tenths of millimeters. The range must be less than the maximum width of the supply.

Values:

9425	0-508 (0 to 2 inches)
9445	0-1016 (0 to 4 inches)
9465	0-1016 (0 to 4 inches)
9474	0-1016 (0 to 4 inches)

`DIRECTION` One digit to define the direction of the line.

Values: **0** = Vertical
1 = Horizontal

`STOP` One to four digits to define the stop position (Row or Column, dependent on the DIRECTION setting) for the line.

Values: **1-2032**

`THICKNESS` One or two digits for the line thickness in dots.

9425	1 dot = 1/192 inch
9445	1 dot = 1/192 inch
9465	1 dot = 1/192 inch (horizontal line) 1 dot = 1/264 inch (vertical line)
9474	1 dot = 1/192 inch

Values: **1-15**

NOTE: Horizontal and vertical line widths on the 9465 printer do not match exactly. To choose compatible horizontal and vertical line widths, refer to the Line Width table in "Quick References."

Example

```
L22,400,100,1,190,5
```

This line field has the following attributes:

- Line field number is L22.
- Line begins 40 millimeters from the bottom of the print area.
- Line begins 10 millimeters from the left edge of the print area.
- This is a horizontal line (direction = 1).
- The line ends 19 millimeters from the left edge of the supply.
- The line is 5 dots thick.

Syntax Checklist

- Make sure this record is preceded by a format header record.
- Make sure the first parameter (field number) begins with L.

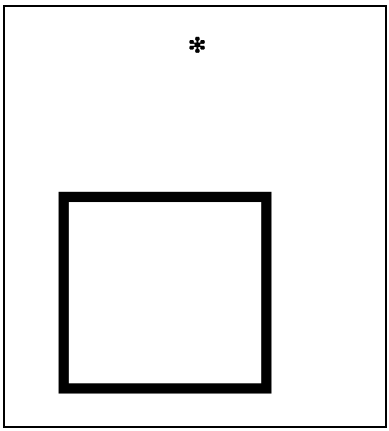
- Make sure the row and column locations in this record are less than the supply length and width.
- Make sure your end point does not make the line run off the supply.
- Make sure the record ends with a record separator (¦).
- If this is the last record in your format, place a close brace (}) at the end of the record.

Example

This example draws a simple 1-inch box starting at row 50 and column 50 on a 2" x 2.5" tag, as shown below. (Line width values are for the 9425/45/74.)

Format
```
{F1,635,508;BOX ¦
L0,50,50,0,304,3 ¦
L1,50,50,1,304,3 ¦
L2,50,304,0,304,3 ¦
L3,304,50,1,316,3 ¦
}
```

Batch
```
{B1,1,0,1,1,1,C;BOX.TEST ¦
}
```



Note that line L3 is longer than the other 3 lines to complete the box in the upper right corner.

Batch Data

The batch data stream contains:

- Batch information:

  - format number (layout for the print image)
  - print quantity
  - supply definition
  - item description (batch name)

- Print image:

  - field numbers
  - data to be printed in each field

The message structure used to provide the printed data for an online format is shown below. An example follows.

```
{B##,QUANTITY,CUT,REP,PARTS,0,MODE;BATCH_NAME  ¦
       T##;(..print data..)  ¦
       B##;(..print data..) ¦
              .
              .
              .
}
```

Batch Header Record

The batch header is the first record in the batch data stream.

Syntax

```
       {B##,QUANTITY,CUT,REP,PARTS,0,MODE;BATCH_NAME  ¦
```

Field	Contents
`B##`	Must begin with the letter "B" to begin a batch data stream. The B is followed by the one or two digit number that matches the format number. This is the number at the beginning of the format record. Values: **0-99**

`QUANTITY` One to four digits for the quantity to print in a given batch.

Values: **1-9999**

`CUT/TAKEUP` *On printers with a knife:*

One digit to control how tickets are cut.

Values:

0 = no cut
1 = cut each ticket in the batch (except last ticket)
2 = cut each ticket in the batch (including last ticket in batch)
3 = cut between batches

NOTE: Do not use option 2 if your supply is:

- Less than 4 inches long (1016 tomms)
- More than 8 inches long (2032 tomms)

When using option 2, the first 0.7 inches of the supply cannot be used for printing.

On non-knife printers:

On a 9445, 9465, or 9474 with no knife, this parameter controls the backing paper takeup, instead of the knife.

Values:

0 = print tags with no backing paper.

1 = print labels and take up the backing paper.

REP — One to four digits for the supply repetition for cutting, and increment/decrement field.

Values: **1-9999**

PARTS — One digit for the number of parts across the supply.

Values: **1-5**

RESERVED — Enter **0**.

MODE — One character to define the mode of printing, or batch separator.

Values:

0 = separator off.

1 = double length separator (use for 924 or 925 stacker). 3 mm extra length tag on 920 stacker.

2 = normal length separator with 3 mm black stripe.

3 = 3 mm extra length tag with 6 mm stripe.

NOTE: If using value 0,1, 2, or 3, do not use a separate batch separator packet.

C = Continuous

D = On Demand (not available on 9425 printer)

NOTE: If you enter D (On Demand) in the MODE field on a printer with a knife, the value will default to C (Continuous).

`;BATCH_NAME` One to eight characters for the name of the batch. A priority batch name must begin with a decimal. For example: .SOCKS12.

NOTE: Each batch should have a unique name, or you can omit the name for automatic batch naming. If multiple batches are sent with the same name, all batches are stored with the same name.

If you omit the batch name, the printer will generate unique names which begin with the letters "AUTO" and end with a 4-digit number. The 4-digit number is an increment and can have a value from 1-9999 (example: AUTO1354, where 1354 equals the increment).

Example

```
{B11,200,2,5,2,0,3;
```

This batch has the following attributes:

- This batch prints data using format 11.
- This batch will print 200 tickets.
- The printer will cut after each ticket is printed, including the last ticket (2).
- Each ticket will print 5 times.
- This is a two-part ticket. The format will print 2 times horizontally across each ticket.
- A double-length separator will print between batches (3).
- The batch name will be automatically assigned by the printer (no characters between the semi-colon and the record separator).

Syntax Checklist

- Make sure this record begins with an open brace ({).
- Make sure the first parameter (batch header) begins with B.
- Make sure the number in the first parameter matches the number of the format you are using.
- If you assign a name to the batch, make sure the name begins with a semi-colon (;).
- If you choose auto-naming (the printer assigns a batch name), make sure there are no characters or spaces between the semi-colon (;) and the record separator (¦).
- Make sure this record ends with a record separator (¦).

Entering Print Data for Fields

Enter the data to print in each field after the batch header record as shown.

Syntax

```
{B##,QUANTITY,CUT,REP,PARTS,0,MODE;BATCH_NAME  ¦
       T##;print data.. ¦
       B##;print data.. ¦
              .
              .
              .
}
```

`T##`	The number of the text field to print (enter the number in place of ##).
`B##`	The number of the bar code field to print (enter the field number in place of ##).
`;print data ¦`	Enter the data you want to print in this field. This character string begins with a semi-colon (;) and can be 1 to 100 characters long. Place a record separator (¦) at the end of this string.

If there is a text field you don't want to use, enter that field number and a semi-colon with no print data.

Example

This example contains data to print the label shown below. You'll find the data stream for this format in the section "Format Data."

```
{B1,0012,1,01,1,0,C;PTEST  ¦
       T00;TEST FORMAT1 ¦
       T01;S/N 97464B  ¦
       T02;$12.34  ¦
       B00;0012345678905 ¦
}
```

This batch has the following attributes:

- This batch prints the phrase **"TEST FORMAT 1"** in text field **T00**.
- This batch prints the phrase **"S/N 97464B"** in text field **T01**.
- This batch prints the phrase **"$12.34"** in text field **T02**.
- This batch prints the number **"0012345678905"** in bar code field **B00**.

Syntax Checklist

- Make sure these batch data records are preceded by a batch header record.
- Make sure the first parameter (field number) matches the field number in your format.

- If the field is an incrementing field, you can enter any type of characters; however, only the numeric data will increment.
- Make sure the print data begins with a semi-colon (;).
- Make sure each record ends with a record separator (¦).
- Place a close brace (}) at the end of the last record.

NOTES:

1. Send the correct format to the printer before sending the batch. Batch data that doesn't have a defined format will generate an error.
2. If consecutive batch data streams use the same format, send only the changed data fields. See the following section, "Using Previously Defined Print Data."

Using Multiple Batches with One Format

You can send multiple batches for any format previously loaded into the printer. To do so, send the format to the printer, then send as many batches as you want to print data on that format.

This allows you to send multiple batches without sending a new format with each batch.

Using Previously Defined Print Data

When sending multiple batches for one format, you can "re-use" your print data. On consecutive batches, the data in a field does not change, omit that field from the later batch.

When you leave out any field number that was specified in the preceding batch, the data used in the preceding batch will print on following batches until new field data is entered.

For example, batch 1 below prints a date in text field T01. Since batch 1 and batch 2 are printed on the same day, batch 2 can leave out field T01. Since T01 was defined in the preceding batch, it will automatically print in batch 2.

Batch 1:

```
{ B12,1,0,1,1,0,C; ¦
  T01;12/31/90 ¦
  T02;Stock #43768
  T03;100’ Hose
  }
```

Batch 2:

```
{ B12,1,0,1,1,0,C; ¦
  T02;Stock #52014
  T03;Sprinkler
  }
```

NOTE: If two fields overlap, do NOT use this feature. If fields overlap, you must send the format before each batch.

Batch Separators

This command selects the use of batch separators. A batch separator is a tag with a wide black line across the top or a double length tag and is last tag in a batch. Your *Operator’s Handbook* shows the type of batch separator used by your printer.

NOTE: When printing online, add 1 to your batch quantity. The batch separator does not add a tag to the total number of tags in a batch. (In offline operation a batch separator increases the batch count by one tag.)

The command structure is shown below, followed by an example.

NOTE: If using this batch separator packet, make sure the batch header "MODE" value is set to **C**.

```
{ S TYPE }
```

Field	Contents
S	Must be the letter 'S' to identify the batch separator selection.
TYPE	A single digit to turn the batch separator selection on or off. The resulting separator depends on the type of stacker you are using. Values 0, 1, 2, or 3 as shown in the table below.

Stacker Type **Data Stream**	**none**	**920**	**924/925**
{S0}	No separator	No separator	No separator
{S1}	Double length tag with no stripe	3 mm extra length tag with 6 mm stripe	Double length tag with no stripe
{S2}	Normal length tag with 3 mm stripe	Normal length tag with 3 mm stripe	Normal length tag with 3 mm stripe
{S3}	3 mm extra length tag with 6 mm stripe	3 mm extra length tag with 6 mm stripe	3 mm extra length tag with 6 mm stripe

Example

Format data stream.

```
{      F 12, 560, 508;SMALL2IN ¦
              T1, I, 0, 300, 50, 1, 1, 0, 0, B ¦
              T2, I, 0, 200, 50, 1, 1, 0, 0, B ¦
              T3, I, 0, 150, 50, 1, 1, 0, 0, B ¦
              T4, I, 0, 100, 50, 1, 1, 0, 0, B ¦
              T5, I, 0, 050, 50, 1, 1, 0, 0, B ¦
}
```

Batch data stream.

```
{S0}
{      B 12, 1, 0, 1, 1, 0, C;SMALL2IN ¦
              T1;Separators off. ¦
              T2;Line 2. ¦
              T3;Line 3. ¦
              T4;Line 4. ¦
              T5;Line 5. ¦
}
```

Turn batch separator on; print another batch.

```
{S1}
{      B 12, 1, 0, 1, 1, 0, C;SEP.ON ¦
              T1;Separators on. ¦
              T2;Line 2. ¦
              T3;Line 3. ¦
              T4;Line 4. ¦
              T5;Line 5. ¦
}
```

Turn batch separator off.

```
{S0}
```

5. Using Graphics

There are two stages to printing a graphic:

- Create the data stream for the graphic image
- Place the image into a format.

To print a format with a graphic image, transmit data to the printer in this order:

1. Graphic data stream to define the graphic image
2. Format data stream that references the graphic image
3. Batch data to print the format.

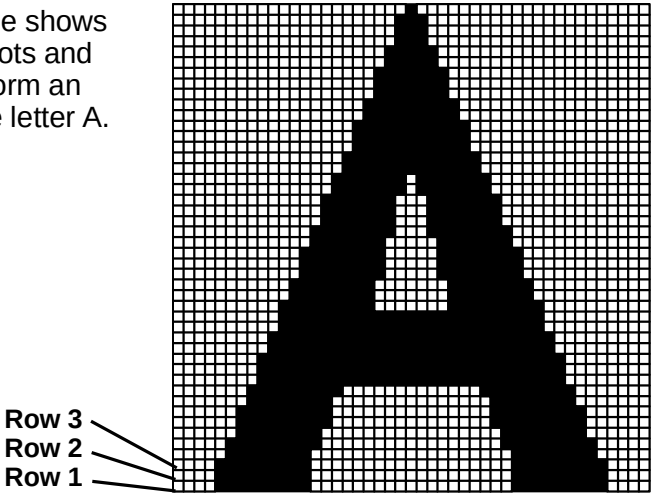
Defining Graphic Image Data

Graphic images are created by a series of dots printed in a specific pattern. This pattern results from a process of turning dots "ON" or "OFF" on the printhead.

We will use the terms "black dots" to describe a dot that is ON, and "white dots" for a dot that is OFF.

This section describes how to build a data stream to create this pattern with your printer.

This example shows how black dots and white dots form an image of the letter A.



To create a data stream for this image, start with the bottom row. Count the number of white dots and black dots, in order of appearance in each row.

For example, rows 1 through 4 (at the bottom) in the image above have these dot counts:

Row 1: **4** White, **8** Black, **19** White, **8** Black, **4** White

Row 2: **4** White, **8** Black, **19** White, **8** Black, **4** White

Row 3: **4** White, **8** Black, **19** White, **8** Black, **4** White

Row 4: **5** White, **7** Black, **19** White, **7** Black, **5** White

The data stream uses letters to identify dot counts.

- CAPITAL letters represent **black** dots.
- lowercase letters represent **white** dots.

Using the coding chart below, the data stream for row 1 would be written as follows:

Dot count:

Row 1: **4** White, **8** Black, **19** White, **8** Black, **4** White

Data Stream:

dHsHd¦
(4 white = **d**, 8 black = **H**, 19 white = **s**)

You can use multiple letter codes to indicate strings of same-color dots. For example:

30 black dots = ZD
9 white dots = ccc

Coding Chart							
Black Dots				**White Dots**			
# dots	Code	# dots	Code	# dots	Code	# dots	Code
1	A	14	N	1	a	14	n
2	B	15	O	2	b	15	o
3	C	16	P	3	c	16	p
4	D	17	Q	4	d	17	q
5	E	18	R	5	e	18	r
6	F	19	S	6	f	19	s
7	G	20	T	7	g	20	t
8	H	21	U	8	h	21	u
9	I	22	V	9	i	22	v
10	J	23	W	10	j	23	w
11	K	24	X	11	k	24	x
12	L	25	Y	12	l	25	y
13	M	26	Z	13	m	26	z

The graphic data stream contains a graphic header record followed by data streams for each row of dots in the image.

Syntax

```
{      G##,0,0,0,0 ¦
       ;...dot codes... ¦
       ;...dot codes... ¦
       ;...dot codes... ¦
       .
       .
       .
}
```

Field	Contents
G##	Must begin with the letter "G" to identify this as a graphic data stream. The G is followed by a one or two digit number to identify the graphic image. Later you will use this number to insert the graphic into a format. Values: **0-99** **NOTE:** If this graphic is used in offline batch entry, the printer assigns a name of GPH## where ## is the ID number assigned here.
ROW	Enter 0.
COLUMN	Enter 0.
LINES	Enter 0.
DOTS	Enter 0.

NOTE: The parameters ROW, COLUMN, LINES and DOTS exist to maintain the 9420/9440 data structure. These parameters are not used by the 9425/9445/9465/9474 printers, but must be in the data stream. The values can be valid 9420 values, or can be set to 0.

`;dot codes`

The first row of dot codes corresponds to the bottom row of dots in the image. Essentially, this means you are building the graphic image upside down in the data stream.

Note that since this record is a character string, it begins with a semi-colon (;). You can place up to 100 characters in each row.

Do not put any spaces in the dot code character string.

Example

This graphic data stream generates the letter A from the grid earlier in this section. The format and batch data streams to print a sample tag follow the graphic data stream.

```
{       G1,0,0,0,0 ¦
        ;dHsHd ¦
        ;dHsHd ¦
        ;dHsHd ¦
        ;eGsGe ¦
        ;eHqHe ¦
        ;fGqGf ¦
        ;fHoHf ¦
        ;fHoHf ¦
        ;gGoGg ¦
        ;gHmHg ¦
        ;hGMGh ¦
        ;hGMGh ¦
        ;hGMGh ¦
        ;iFMFi ¦
        ;iFMFi ¦
        ;jEMEj ¦
        ;jEMEj ¦
        ;jEMEj ¦
        ;kHgHk ¦
        ;kHgHk ¦
        ;lGgGl ¦
        ;lHeHl ¦
        ;lHeHl ¦
        ;mGeGm ¦
        ;mGeGm ¦
        ;nGcGn ¦
        ;nGcGn ¦
        ;nGcGn ¦
        ;oFcFo ¦
        ;oGaGo ¦
        ;pFaFp ¦
        ;pFAFp ¦
        ;qEAEq ¦
        ;qEAEq ¦
        ;qEAEq ¦
        ;rDADr ¦
        ;rDADr ¦
        ;sCACs ¦
        ;sCACs ¦
        ;sCACs ¦
        ;tBABt ¦
        ;tBABt ¦
        ;uCu ¦
        ;uCu ¦
        ;uCu ¦
        ;vAv ¦
}
```

The graphic has the following attributes:

- This graphic is assigned a number of 1.
- This graphic is 46 dots tall.

Syntax Checklist

- Make sure the data stream begins with an open brace ({).
- Make sure the first record in the data stream begins with G.
- Make sure each data row begins with a semi-colon (;).
- Make sure each record ends with a record separator (¦).
- Place a close brace (}) at the end of the last record.

Placing the Image in a Format

The message structure below places a graphic field in a format.

You can have up to 100 graphic images. The graphic record can be placed in a format data stream anywhere following the format header record.

Syntax

```
G##, ROW, COLUMN ¦
```

NOTE: Graphics are counted as fields, just like text or bar code fields. When determining the number of fields in your format, count each graphic as a separate field.

If graphic fields overlap with other fields in the data stream, the last field in the data stream will dominate.

Field	Contents
G##	Must begin with the letter "G" for a graphic field. The G is followed by one or two digits for the graphic number. Enter the number you assigned to the graphic in the graphic data stream. Values: **0-99**
ROW	One to four digits to define the row location of the graphic on the supply. This is the distance from the the guide edge zero point at the *bottom* of the supply and the bottom of the field. The zero point is 1.5 mm or 0.060 inches from the bottom of the supply. The bottom of the supply is the edge that exits the printer first.

This value is measured in tenths of millimeters (TOMMS) and must be less than the maximum length of the supply.

Values: **0-2032**

`COLUMN` One to four digits to define the column location of the field on the supply. This is the distance from the guide edge zero point at the *left* edge of the supply and the left edge of the field.

The zero point is 1.5 mm or 0.060 inches from the left edge of the supply.

The unit of measurement is tenths of millimeters. The range must be less than the maximum width of the supply.

Values:

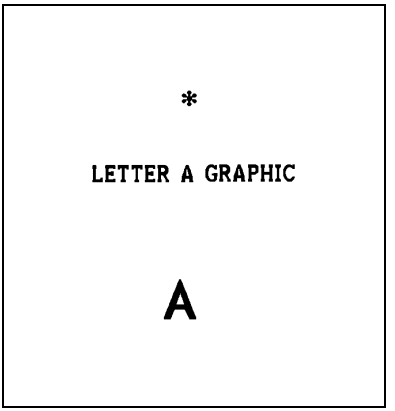
9425	**0-508** (0 to 2 inches)
9445	**0-1016** (0 to 4 inches)
9465	**0-1016** (0 to 4 inches)
9474	**0-1016** (0 to 4 inches)

The following format data stream uses the graphic data defined earlier in this chapter. The graphic is inserted 20 mm from the bottom and 20 mm from the left edge of the supply.

```
{
       F11,550,507;LETTER-A ¦
       G1,200,200 ¦
       T0,I,0,400,100,1,1,0,0,B ¦
}
```

The following batch data stream prints the tag below.

```
{
       B11,1,1,1,1,0,C;LETTER-A ¦
       T0;LETTER-A GRAPHIC ¦
}
```



Example

```
G1,100,40 ¦
```

The graphic is inserted into the format as follows:

- Insert graphic number 1 into the format.
- Place the graphic 10 millimeters from the bottom of the print area.
- Place the graphic 4 millimeters from the left edge of the print area.

Syntax Checklist

- Make sure this record is preceded by a format header record.
- Make sure the first parameter in the record begins with G.
- Make sure the number in the first parameter matches the number of the graphic.
- Make sure the record ends with a record separator (¦).
- If this is the last record in the format, place a close brace (}) at the end of the record.

Clear Image Buffer

This command clears all or selective graphics from the image buffer. Once graphic data is sent to the printer, that graphic stays in memory until a clear image buffer command is sent.

```
{ C## }
```

Example

```
{C}
```

Field	Contents
c	Must be the letter 'C' to identify the clear image buffer command. See the next section for more information about the clear command.
##	This optional parameter will specify a particular graphic to be cleared from memory. It must match the number assigned in the graphic data stream. If omitted, ALL graphics in memory will be deleted.

Example {C} Clears all graphics from the printer.

{C4} Clears only graphic number 4.

Compressing the Data Stream

Image data usually consists of a large amount of repetitive data. Therefore, the printer uses a data compression algorithm for the graphic message structure. Here's how it works.

1. Any image is defined as a matrix of cells.

2. Each row of the matrix consists of a series of consecutive ON (black) or OFF (white) cells. The range is 1-26, represented by adding either a hex 40 (black) or hex 60 (white). Cells that print black will be represented by the upper case letters 'A' through 'Z' in the file sent to the printer. Cells that print white will be represented by the lowercase letters 'a' through 'z' in the file sent to the printer. Consecutive cells greater than 26 require multiple letters.

   Example: 39 consecutive white cells would be represented by the letters 'zm' (i.e. 'z' produces 26 white cells followed by 'm' or 13 more white cells).

3. Each row of the matrix is terminated by the command inter-record separator, split vertical bar (¦). However, the last row of the matrix ends with the TERMINATOR command, closed brace (}).

4. In addition to compressing consecutive cells, repetitive lines of compressed row data can be combined. For example, if twelve rows have the same data (;zm), a number can be added at the beginning of the line to repeat the line (;12zm).

The following example shows how you can compress the "Letter A" data stream. The long version is on the left. The compressed version of the same data stream is on the right.

Long Version

```
{G1,0,0,0,0 ¦
;dHsHd ¦
;dHsHd ¦
;dHsHd ¦
;eGsGe ¦
;eHqHe ¦
;fGqGf ¦
;fHoHf ¦
;fHoHf ¦
;gGoGg ¦
;gHmHg ¦
;hGMGh ¦
;hGMGh ¦
;hGMGh ¦
;iFMFi ¦
;iFMFi ¦
;jEMEj ¦
;jEMEj ¦
;jEMEj ¦
;kHgHk ¦
;kHgHk ¦
;lGgGl ¦
;lHeHl ¦
;lHeHl ¦
;mGeGm ¦
;mGeGm ¦
;nGcGn ¦
;nGcGn ¦
;nGcGn ¦
;oFcFo ¦
;oGaGo ¦
;pFaFp ¦
;pFAFp ¦
;qEAEq ¦
;qEAEq ¦
;qEAEq ¦
;rDADr ¦
;rDADr ¦
;sCACs ¦
;sCACs ¦
;sCACs ¦
;tBABt ¦
;tBABt ¦
;uCu ¦
;uCu ¦
;uCu ¦
;vAv ¦
}
```

Compressed Version

```
{G1,0,0,0,0 ¦
;3dHsHd ¦
;eGsGe ¦
;eHqHe ¦
;fGqGf ¦
;2fHoHf ¦
;gGoGg ¦
;gHmHg ¦
;3hGMGh ¦
;2iFMFi ¦
;3jEMEj ¦
;2kHgHk ¦
;lGgGl ¦
;2lHeHl ¦
;2mGeGm ¦
;3nGcGn ¦
;oFcFo ¦
;oGaGo ¦
;pFaFp ¦
;pFAFp ¦
;3qEAEq ¦
;2rDADr ¦
;3sCACs ¦
;2tBABt ¦
;3uCu ¦
;vAv ¦
}
```

6. Quick References

Text Font Sizes

The 9425, 9445, 9465, and 9474 printers can print using 9425/9445/9465/9474 fonts, or using 9420/9440 fonts (*9420/9440 Compatible Mode*). The fonts are selected in Printer Configuration in offline mode only. Be sure the fonts selected at the printer are compatible with the format and batch data you are downloading.

NOTE: If 9420/9440 Compatible Mode is selected at the printer, the horizontal field location is also modified slightly. Refer to "9420/9440 Horizontal Print Location."

9425/9445/9465/9474 Fonts

The 9425/9445/9465/9474 fonts are proportional (each character takes only as much space as it needs). Uppercase **I** is the narrowest character and results in the most characters per inch. Uppercase **M** is the widest and results in the fewest characters per inch. In the following table uppercase **I** was used to calculate the most characters per inch. Uppercase **M** was used to calculate the fewest characters per inch.

If you rotate the characters (with the top of the characters toward the left or right side of the stock) you will get the characters per inch shown in the table labeled "Rotated Characters."

Parallel Characters

Value/Font	Characters/Inch		Character Height (in.)
	I	M	
1/Standard	21.3	12.0	0.10
2/Reduced	64.0	24.0	0.07
3/Bold	19.2	7.1	0.20
5/OCR-A	10.1	10.1	0.10
6/UPC HR1	19.2	13.7	0.10
7/UPC HR2	32.0	19.2	0.08

Rotated Characters

Font	Characters per Inch
Standard	10
Reduced	14
Bold	5
OCR-A	10

9420/9440 Fonts

The 9420/9440 fonts are monospaced (every letter uses the same amount of space). The following tables show the characters per inch for parallel and serial characters. If you rotate the characters (with the top of the characters toward the left or right side of the stock) you will get the characters per inch shown in the table labeled "Rotated Characters."

Parallel Characters

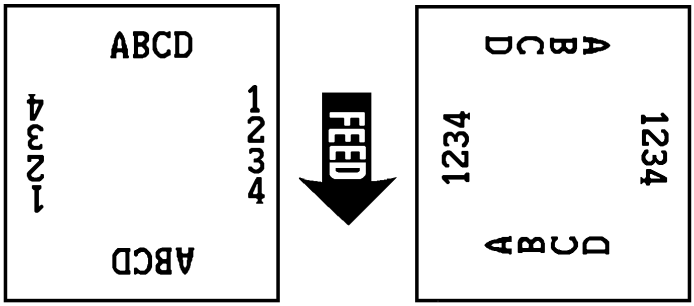
Font	Characters per Inch
Standard	12
Reduced	24
Bold	6
OCR-A	10

Rotated Characters

Font	Characters per Inch
Standard	10
Reduced	14
Bold	5
OCR-A	10

Character Width (in Dots)

The size of the characters is the same on the 9425, 9445, 9465, and 9474 printers. However, there are more dots per horizontal inch on the 9465. Because of this, parallel characters on the **9465 only** have a higher number of dots per character (across the character width). The dots per character is the same for the 9425, 9445, and 9474 printers for all characters, and for the 9465 printer for serial characters. The examples below show the difference between parallel characters and serial characters.



Parallel Characters **Serial Characters**

Parallel Character Width (in Dots) for the 9425, 9445, and 9474

The following table shows the width of the 9425, 9445, and 9474 characters in dots. Uppercase I is the narrowest character (fewest dots per character). Uppercase M is the widest character (most dots per character).

Value/Font	Dots Wide		ICG*
	I	M	
1/Standard	7	14	2
2/Reduced	2	7	1
3/Bold	7	24	3
5/OCR-A	16	16	3
6/UPC HR1	12	12	2
7/UPC HR2	10	10	1

*Inter-character gap

Serial Character Width (in Dots) for 9465

Value/Font	Dots Wide		ICG*
	I	M	
1/Standard	7	14	2
2/Reduced	2	7	1
3/Bold	7	24	3
5/OCR-A	16	16	3
6/UPC HR1	12	12	2
7/UPC HR2	10	10	1

*Inter-character gap

Parallel Character Width (in Dots) for 9465

Value/Font	Dots Wide		ICG*
	I	M	
1/Standard	10	20	3
2/Reduced	3	10	1
3/Bold	6	28	4
5/OCR-A	19	19	4
6/UPC HR1	18	18	2
7/UPC HR2	14	14	1

*Inter-character gap

The table below shows the character width (in dots) for the 9420/9440 fonts. There is no inter-character gap for the 9420/9440 fonts.

Parallel Character Width (in Dots) for 9420/9440 Fonts

Value/Font	Dots Wide
1/Standard	16
2/Reduced	8
3/Bold	32
5/OCR-A	19
6/UPC HR1	14
7/UPC HR2	10

Serial Character Width (in Dots) for 9420/9440 Fonts

Value/Font	Dots Wide
1/Standard	24
2/Reduced	14
3/Bold	48
5/OCR-A	24
6/UPC HR1	24
7/UPC HR2	16

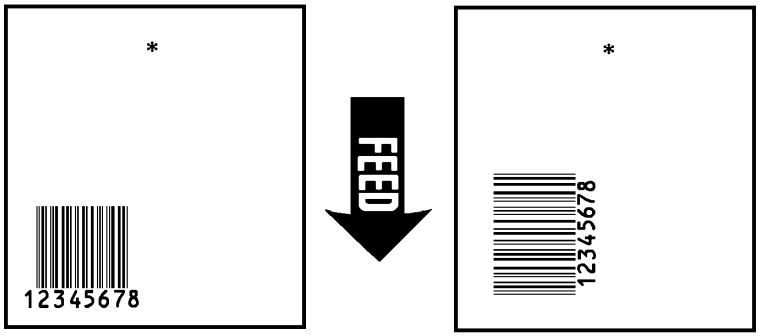
Bar Codes

The table below lists bar code selections and values.

Value	Dots Wide
1	UPC-A
2	UPC-E
3	Interleaved 2 of 5
4	Code 39
5	Codabar
6	EAN-8
7	EAN-13
8	Code 128
9	MSI
10	UPC/EAN+2
11	UPC/EAN+5

Bar Code Densities

Because the 9465 printhead has more dots per horizontal inch, parallel bar codes on the 9465 only have a higher density than serial bar codes. (Bar code densities are the same on the 9425, 9445, and 9474 printers for all bar codes, and on the 9465 printer for serial bar codes.) The samples below show the difference between parallel and serial bar codes.



Parallel Bar Code **Serial Bar Code**

Bar Code Densities (9425/9445/9474)

Value	Bar Code	Density (Char/in)
1	Code 39 I 2 of 5 Code 128* MSI UPC/EAN	6.63 12.02 8.74 (alphanumeric) 17.48 (numeric only) 6.87 80% standard density
2	Code 39 I 2 of 5 Code 128* MSI UPC/EAN	3.32 6.87 5.83 (alphanumeric) 11.66 (numeric only) 5.34 120% standard density
3	Code 39 I 2 of 5 Code 128* MSI	4.01 4.93 4.37 (alphanumeric) 8.74 (numeric only) 4.01
4	Code 39** I 2 of 5	12.02 3.01
5	Code 39	6.01

* For more information on Code 128, see Appendix B.

** This density is not supported on the 9474 printer.

Bar Code Densities (9420/9440)

Value	Bar Code	Density (Char/in)
1	Code 39 I 2 of 5 Code 128* MSI	6.63 12.02 8.74 (alphanumeric) 17.48 (numeric only) 6.87
2	Code 39 I 2 of 5 Code 128* MSI	3.32 6.87 5.83 (alphanumeric) 11.66 (numeric only) 5.34
3	Code 39 I 2 of 5 Code 128* MSI	4.01 4.93 4.37 (alphanumeric) 8.74 (numeric only) 4.01
4	Code 39 I 2 of 5	12.02 3.01
5	Code 39	6.01

* For more information on Code 128, see Appendix B.

Bar Code Densities (9465, Parallel Print)

Value	Bar Code	Density (Char/in)
1	Code 39 I 2 of 5 Code 128* MSI UPC/EAN	6.63 12.02 8.74 (alphanumeric) 17.48 (numeric only) 6.87 87% standard density
2	Code 39 I 2 of 5 Code 128* MSI UPC/EAN	3.32 6.87 5.83 (alphanumeric) 11.66 (numeric only) 5.34 117% standard density
3	Code 39 I 2 of 5 Code 128* MSI	4.01 4.93 4.37 (alphanumeric) 8.74 (numeric only) 4.01
4	Code 39 I 2 of 5	12.02 3.01
5	Code 39	6.01

* For more information on Code 128, see Appendix B.

Bar Code Densities (9465, Serial Print)

Value	Bar Code	Density (Char/in)
1	Code 39 I 2 of 5 Code 128* MSI UPC/EAN	6.63 12.02 8.74 (alphanumeric) 17.48 (numeric only) 6.87 80% standard density
2	Code 39 I 2 of 5 Code 128* MSI UPC/EAN	3.32 6.87 5.83 (alphanumeric) 11.66 (numeric only) 5.34 120% standard density
3	Code 39 I 2 of 5 Code 128* MSI	4.01 4.93 4.37 (alphanumeric) 8.74 (numeric only) 4.01
4	Code 39 I 2 of 5	12.02 3.01
5	Code 39	6.01

* For more information on Code 128, see Appendix B.

Line Width

The following tables show the horizontal and vertical line widths. On the 9425/9445/9474 and 9420/9440 printers, the line widths are the same for horizontal and vertical lines. On the 9465, horizontal and vertical line widths are different.

Line Widths (9425/9445/9474 and 9420/9440)

The following table shows the horizontal and vertical line widths for the 9425/9445/9474 and 9420/9440 printers.

Line Number	Appearance	Line Width	
		Inches	MM
1		.005	.13
2		.010	.26
3		.015	.40
4		.021	.53
5		.026	.66
6		.031	.79
7		.036	.92
8		.042	1.06
9		.046	1.16
10		.052	1.32
11		.057	1.44
12		.062	1.57
13		.067	1.70
14		.072	1.82
15		.078	1.98

Horizontal Line Widths (9465)

The following table shows the horizontal line widths for the 9465.

Line Number	Appearance	Line Width	
		Inches	MM
1		.005	.13
2		.010	.26
3		.015	.40
4		.021	.53
5		.026	.66
6		.031	.79
7		.036	.92
8		.042	1.06
9		.046	1.16
10		.052	1.32
11		.057	1.44
12		.062	1.57
13		.067	1.70
14		.072	1.82
15		.078	1.98

Vertical Line Widths (9465)

The following table shows the vertical line widths for the 9465.

Line Number	Appearance	Line Width	
		Inches	MM
1		.003	.076
2		.008	.177
3		.011	.279
4		.015	.381
5		.019	.457
6		.023	.558
7		.027	.660
8		.030	.762
9		.034	.863
10		.038	.939
11		.042	1.041
12		.046	1.143
13		.049	1.244
14		.053	1.346
15		.057	1.422

Special Characters

The following table shows the ASCII code for special characters available in the standard font.

ASCII Code	Symbol Description
~128	Hashed box
~129	Pound or Lira
~130	Yen
~131	Kronna
~132	Deutsche mark
~133	Markka
~134	Schilling
~135	Half sign
~136	Rupee

Code 128 Function Codes

The following table shows the ASCII code for the Code 128 function codes.

ASCII Code	Function Code
~134	F_1
~129	F_2
~128	F_3
~132	F_4

9420/9440 Horizontal Print Location

If the printer is set for 9420/9440 compatible mode, the field location starts at the nearest 8th dot (nearest 0.04 inch) to the location you enter. The following table shows the offline and online values you may use for the horizontal print location when the printer is in 9420/9440 compatible mode. If you use a value that is not listed, the print position shifts plus or minus to the closest number in the table. The maximum shift is 0.02 inch (0.5mm).

NOTE: If the printer is not in 9420/9440 compatible mode, the default horizontal field location is the dot nearest to the location you enter (nearest 0.0052 inch).

Offline inches	mm	Online tomms	Offline inches	mm	Online tomms
0.06	001.6	0	0.85	021.7	201
0.10	002.7	10	0.89	022.8	211
0.14	003.7	21	0.94	023.8	222
0.19	004.8	31	0.98	024.9	232
0.23	005.8	42	1.02	025.9	243
0.27	006.9	52	1.06	027.0	253
0.31	008.0	63	1.10	028.1	264
0.35	009.0	74	1.14	029.1	275
0.39	010.1	84	1.19	030.2	285
0.44	011.1	95	1.23	031.2	296
0.48	012.2	105	1.27	032.3	306
0.52	013.2	116	1.31	033.3	317
0.56	014.3	126	1.35	034.4	328
0.60	015.4	137	1.39	035.5	338
0.64	016.4	148	1.44	036.5	349
0.69	017.5	158	1.48	037.6	359
0.73	018.5	169	1.52	038.6	370
0.77	019.6	179	1.56	039.7	380
0.81	020.7	190	1.60	040.8	391

Offline inches	mm	Online tomms
1.64	041.8	402
1.69	042.9	412
1.73	043.9	423
1.77	045.0	433
1.77	045.0	433
1.81	046.0	444
1.85	047.1	455
1.89	048.2	465
1.94	049.2	476
1.98	050.3	486
2.02	051.3	497
2.06	052.4	507
2.10	053.5	518
2.14	054.5	529
2.19	055.6	539
2.23	056.6	550
2.27	057.7	560
2.31	058.7	571
2.35	059.8	582
2.39	060.9	592
2.44	061.9	603
2.48	063.0	613
2.52	064.0	624
2.56	065.1	634
2.60	066.2	645
2.64	067.2	656
2.69	068.3	666
2.73	069.3	677
2.77	070.4	687
2.81	071.4	698
2.85	072.5	708
2.89	073.6	719
2.94	074.6	730
2.98	075.7	740
3.02	076.7	751
3.06	077.8	761
3.10	078.9	772
3.14	079.9	783
3.19	081.0	793
3.23	082.0	804
3.27	083.1	814
3.31	084.1	825
3.35	085.2	835
3.39	086.3	846
3.44	087.3	857
3.48	088.4	867
3.52	089.4	878
3.56	090.5	888
3.60	091.6	899
3.64	092.6	910
3.69	093.7	920
3.73	094.7	931
3.77	095.8	941
3.81	096.8	952
3.85	097.9	962
3.89	099.0	973
3.94	100.0	984
3.98	101.1	994

ASCII Characters

The following table shows the characters available in each font. HR1 and HR2 are human readable fonts for bar codes.

Character	Std	Reduced	OCRA	Bold	HR1	HR2
	yes	yes	no	no	no	no
#	yes	yes	no	no	no	no
$	yes	yes	yes	yes	no	no
%	yes	yes	no	no	no	no
^	¢	¢	no	¢	no	no
&	yes	yes	no	no	no	no
*	yes		no	no	no	no
(	yes	yes	no	yes	no	no
)	yes	yes	no	yes	no	no
[	[	yes	no	no	no	no
]	]	yes	no	no	no	no
‘(grave)	yes	yes	no	no	no	no
{	yes	yes	no	no	no	no
}	yes	yes	no	no	no	no
~	yes	yes	⌡	no	no	no
,(comma)	yes	yes	¬	no	no	no
"	yes	yes	yes	no	no	no
-	yes	yes	yes	yes	yes	no
=	yes	yes	no	no	no	no
_(underscore)	yes	yes	■	no	no	no
+	yes	yes	yes	no	no	no
.	yes	yes	⍦	yes	no	no
/	yes	yes	yes	yes	no	no
’(apostrophe)	yes	yes	⌐	no	no	no
:	yes	yes	no	yes	no	no
;	yes	yes	no	no	no	no
	yes	yes	yes	no	no	no
	yes	yes	yes	no	no	no
?	yes	yes	no	no	no	no
\	yes	yes	⍲	¥	no	no
|	no	no	no	no	no	no
0-9	yes	yes	yes	yes	yes	yes
A-Z	yes	yes	yes	yes	no	H N *
a-z	yes	yes	no	no	no	no

yes = What you enter is what prints.
no = Character does not exist in this font; nothing prints.

* Uppercase H and N are the only alphabetic characters that print in the Human Readable fonts. All other characters are numeric.

Printable Characters by Font

Following are the printable characters (not at actual size). Human Readable 1 and Human Readable 2 are not available offline.

English/Metric Conversion

Inches	TOMM	Inches	TOMM	Inches	TOMM	Inches	TOMM
-	-	0.060	15	0.075	19	0.100	25
0.125	31	0.150	38	0.175	44	0.200	50
0.225	57	0.250	63	0.275	70	0.300	76
0.325	82	0.350	89	0.375	95	0.400	101
0.425	108	0.450	114	0.475	121	0.500	127
0.525	133	0.550	140	0.575	146	0.600	152
0.625	159	0.650	165	0.675	171	0.700	178
0.725	184	0.750	191	0.775	197	0.800	203
0.825	209	0.850	216	0.875	222	0.900	228
0.925	235	0.950	241	0.975	247	1.000	254
1.025	260	1.050	267	1.075	273	1.100	279
1.125	286	1.150	292	1.175	298	1.200	305
1.225	311	1.250	317	1.275	324	1.300	330
1.325	336	1.350	343	1.375	349	1.400	356
1.425	362	1.450	368	1.475	375	1.500	381
1.525	387	1.550	394	1.575	400	1.600	406
1.625	413	1.650	419	1.675	425	1.700	432
1.725	438	1.750	445	1.775	450	1.800	457
1.825	463	1.850	470	1.875	476	1.900	483
1.925	489	1.950	495	1.975	502	2.000	508
2.025	514	2.050	520	2.075	527	2.100	533
2.125	540	2.150	546	2.175	552	2.200	558
2.225	565	2.250	571	2.275	578	2.300	584
2.325	590	2.350	597	2.375	603	2.400	609
2.425	616	2.450	622	2.475	628	2.500	635
2.525	641	2.550	648	2.575	654	2.600	660
2.625	667	2.650	673	2.675	679	2.700	686
2.725	692	2.750	698	2.775	705	2.800	711
2.825	717	2.850	724	2.875	730	2.900	736
2.925	743	2.950	749	2.975	755	3.000	762
3.025	768	3.050	775	3.075	781	3.100	787
3.125	794	3.150	800	3.175	806	3.200	813
3.225	819	3.250	825	3.275	832	3.300	838
3.325	844	3.350	850	3.375	857	3.400	863
3.425	869	3.450	876	3.475	882	3.500	889
3.525	895	3.550	902	3.575	908	3.600	914
3.625	921	3.650	927	3.675	933	3.700	939
3.725	946	3.750	952	3.775	959	3.800	965
3.825	971	3.850	978	3.875	984	3.900	990
3.925	996	3.950	1003	3.975	1009	4.000	1016
4.025	1022	4.050	1028	4.075	1035	4.100	1041
4.125	1048	4.150	1054	4.175	1060	4.200	1067
4.225	1073	4.250	1079	4.275	1086	4.300	1092
4.325	1099	4.350	1105	4.375	1111	4.400	1118

English/Metric Conversion (cont.)

Inches	TOMM	Inches	TOMM	Inches	TOMM	Inches	TOMM
4.425	1124	4.450	1130	4.475	1137	4.500	1143
4.525	1149	4.550	1156	4.575	1162	4.600	1168
4.625	1175	4.650	1181	4.675	1187	4.700	1194
4.725	1200	4.750	1206	4.775	1212	4.800	1219
4.825	1225	4.850	1232	4.875	1238	4.900	1245
4.925	1251	4.950	1257	4.975	1263	5.000	1270
5.025	1276	5.050	1283	5.075	1289	5.100	1295
5.125	1302	5.150	1308	5.175	1314	5.200	1321
5.225	1327	5.250	1333	5.275	1340	5.300	1346
5.325	1352	5.350	1359	5.375	1365	5.400	1371
5.425	1378	5.450	1384	5.475	1390	5.500	1397
5.525	1403	5.550	1409	5.575	1416	5.600	1422
5.625	1429	5.650	1435	5.675	1441	5.700	1448
5.725	1454	5.750	1460	5.775	1467	5.800	1473
5.825	1479	5.850	1486	5.875	1492	5.900	1499
5.925	1505	6.950	1511	5.975	1518	6.000	1524
6.025	1530	6.050	1537	6.075	1543	6.100	1549
6.125	1556	6.150	1562	6.175	1568	6.200	1575
6.225	1581	6.250	1588	6.275	1594	6.300	1600
6.325	1606	6.350	1613	6.375	1619	6.400	1626
6.425	1632	6.450	1638	6.475	1644	6.500	1651

TOMM = Tenths of millimeters

Appendix A: Sample Data Streams

This appendix contains sample data streams for formats, batches, and graphics. The illustrations show the tags that are printed from these data streams.

Formats, Text and Bar Code Fields

This example shows a standard format with three text and one bar code field.

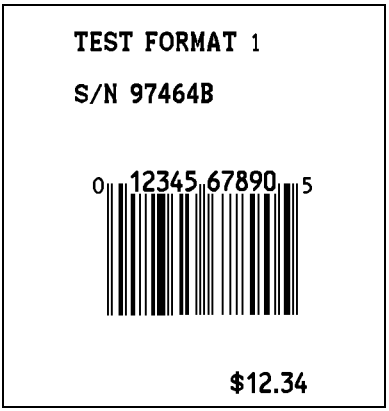
Sample Format Data Stream

```
{       F1,0550,0507;ONLINE ¦
        T00,I,000,0475,0050,1,1,0,0,B ¦
        T01,I,000,0406,0050,1,1,0,0,B ¦
        T02,I,000,0017,0253,1,1,0,0,B ¦
        B00,I,000,0124,0093,1,1,0,0177,1 ¦
}
```

Sample Batch Data Stream

```
{       B1,2,3,1,1,0,c;BATCH1 ¦
        T00;TEST FORMAT 1 ¦
        T01;S/N 97464B ¦
        T02;$12.34 ¦
        B00;0012345678905 ¦
}
```

Sample Tag



Line Fields

This example shows how to use line fields to create a box.

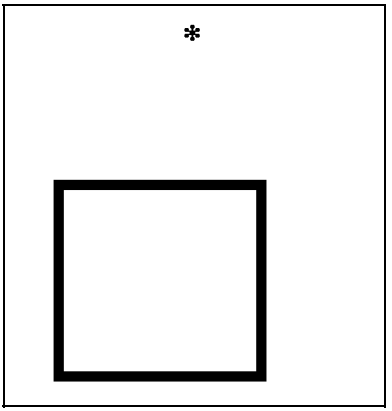
Sample Format Data Stream

```
{       F2,0550,0507;BOX ¦
        L0,50,50,0,304,10 ¦
        L1,50,50,1,304,10 ¦
        L2,50,304,0,304,10 ¦
        L4,304,50,1,316,10 ¦
}
```

Sample Batch Data Stream

```
{       B2,1,0,1,1,1,C;BOXTEST ¦ }
```

Sample Tag



Graphic Images

This Graphic data stream precedes the format that uses it.

Sample Graphic Data Stream

```
{       G3,0,0,0,0 ¦
        ;dHsHd ¦
        ;dHsHd ¦
        ;dHsHd ¦
        ;eGsGe ¦
        ;eHqHe ¦
        ;fGqGf ¦
        ;fHoHf ¦
        ;fHoHf ¦
        ;gGoGg ¦
        ;gHmHg ¦
        ;hGMGh ¦
        ;hGMGh ¦
        ;hGMGh ¦
        ;iFMFi ¦
        ;iFMFi ¦
        ;jEMEj ¦
        ;jEMEj ¦
        ;jEMEj ¦
        ;kHgHk ¦
        ;kHgHk ¦
        ;lGgGl ¦
        ;lHeHl ¦
        ;lHeHl ¦
        ;mGeGm ¦
        ;mGeGm ¦
        ;nGcGn ¦
        ;nGcGn ¦
        ;nGcGn ¦
        ;oFcFo ¦
        ;oGaGo ¦
        ;pFaFp ¦
        ;pFAFp ¦
        ;qEAEq ¦
        ;qEAEq ¦
        ;qEAEq ¦
        ;rDADr ¦
        ;rDADr ¦
        ;sCACs ¦
        ;sCACs ¦
        ;sCACs ¦
        ;tBABt ¦
        ;tBABt ¦
        ;uCu ¦
        ;uCu ¦
        ;uCu ¦
        ;vAv ¦
}
```

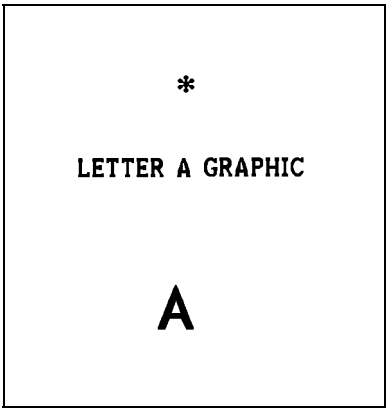
Sample Format Data Stream

```
{       F3,0550,0507;GRAPHIC ¦
        T0,I,0,400,100,1,1,0,0,B ¦
        G3,200,200 ¦
}
```

Sample Batch Data Stream

```
{       B3,1,1,1,1,0,1;LETTER-A ¦
        T0;LETTER A GRAPHIC ¦
}
```

Sample Tag



Compressed Graphic Data

This example shows the same graphic data stream in compressed format.

Sample Compressed Graphic Data Stream

```
{       G3,0,0,0,0 ¦
        ;3dHsHd ¦
        ;eGsGe ¦
        ;eHqHe ¦
        ;fGqGf ¦
        ;2fHoHf ¦
        ;gGoGg ¦
        ;gHmHg ¦
        ;3hGMGh ¦
        ;2iFMFi ¦
        ;3jEMEj ¦
        ;2kHgHk ¦
        ;lGgGl ¦
        ;2lHeHl ¦
        ;2mGeGm ¦
        ;3nGcGn ¦
        ;oFcFo ¦
        ;oGaGo ¦
        ;pFaFp ¦
        ;pFAFp ¦
        ;3qEAEq ¦
        ;2rDADr ¦
        ;3sCACs ¦
        ;2tBABt ¦
        ;3uCu ¦
        ;vAv ¦
}
```

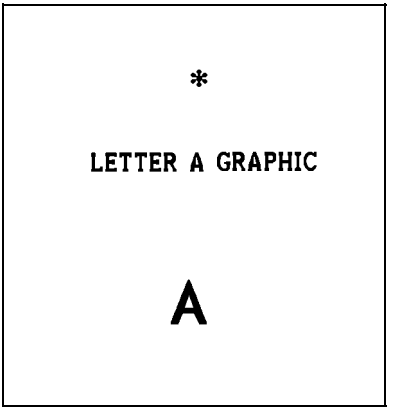
Sample Format Data Stream

```
{       F3,0550,0507;GRAPHIC ¦
        T0,I,0,400,100,1,1,0,0,B ¦
        G3,200,200 ¦
}
```

Sample Batch Data Stream

```
{       B3,1,1,1,1,0,1;LETTER-A ¦
        T0;LETTER A GRAPHIC ¦
}
```

Sample Tag



Appendix B: Code 128 Information

The 128 bar code is divided into 3 character sets (Code A, Code B, and Code C). Depending on the character set used, the same bar pattern can be one of three characters. Table 1, at the end of this appendix, lists the characters in each character set.

Code A contains upper case letters (A-Z), special characters, and control characters. Code A does not have lower case letters.

Code B contains upper and lower case alphanumeric characters and special characters. Code B does not have control characters.

Code C character set contains pairs of numbers. In code C, each bar pattern represents a pair of numbers, ranging from 00 to 99.

When the data contains at least four numbers in a row, 128 switches to code C, then prints one bar pattern for each pair of numbers. This doubles the numeric data per inch.

Therefore, it may be better to pad numeric data with a zero if it has an odd number of characters. The bar codes below show the difference between an odd number of numeric characters and an even number of numeric characters. Do this only if your system can ignore leading zeros.

Bar Code 1
Data = 1234567

Bar Code 2
Data = 01234567

Bar Code 2 is not as wide as Bar Code 1 because all of its characters are printed with bar symbols from code C.

Only 6 of Bar Code 1's characters are printed in code C. The other character has to be printed in code B. Whenever 128 switches from one character set to another, it adds bar patterns that tell a scanner to switch character sets. These extra bar patterns cause wider bar codes.

Bar Code Width

The width of a Code 128 bar code is determined this way:

- If there are four or more numbers in a row, an even number of them print in code C.
- If there are four or more numbers in a row with an odd quantity (e.g., 7 numbers in a row), one of them prints in code B.
- All other alphanumeric characters are printed in code B.

NOTE: The printer determines which character set to use based on the data. No external control of character set selection is required.

For a given quantity of data, the widest bar code will be the one that switches character set most often. Suppose your data has 14 characters (8 numeric + 6 alphabetic).

The bar code for data arranged like this:

Bar code 1
Data = 1234ABC5678DEF

is wider than data arranged like this:

Bar code 2
Data = 12345678ABCDEF

Here's why bar code 1 is wider:

- The 8 numbers in each example appear in groups of four or more, and they appear in even-numbered quantities, therefore, all 8 numbers will use code C.
- The 6 alphabetic characters will use code B.

Look at the example again. This time, data is underlined when the character set changes.

The bar code for data arranged like this:

Bar code 1
Data = 1234ABC5678DEF

is wider than data arranged like this:

Bar code 2
Data = 12345678ABCDEF

This shows that bar code width varies depending on how data is arranged. Separating numeric and alphabetic characters reduces the number of character set changes. Fewer character set changes reduce bar code width.

The table below shows the characters per inch for Code 128. The table shows the values for numeric data, and for alphanumeric data at each of the three densities available on the printer. The characters per inch for your bar code will be somewhere between these two values, depending on the mixture of numeric and alphabetic characters. For a precise calculation of the width of your bar code, refer to the specification for the Code 128 bar code.

Density	Numeric Data	Alpha-numeric data
1	17.48	8.74
2	11.66	5.83
3	8.74	4.37

NOTE: Bar codes printed in **parallel mode** (top of the bar code toward top of tag) on the **9465 only** have the characters per inch shown in the following table.

Density	Numeric Data	Alpha-numeric data
1	23.92	11.96
2	15.95	7.97
3	11.96	5.98

Quiet Zone

When you estimate the area you'll need for the bar code, remember to add the length of the quiet zone. The quiet zone is an area of white space required at the beginning and end of each bar code. The minimum size of the quiet zone is 0.10, or 10 times the width of the narrowest bar code element, whichever is greater. The tables below show the minimum size of the quiet zone at each density. For wand scanning, the quiet zone should be 0.25 to 0.35 inch.

Density	Quiet Zone
1	0.10 inch
2	0.15 inch
3	0.20 inch

The minimum quiet zone for **parallel bar codes** printed on the **9465** are shown in the following table.

Density	Quiet Zone
1	0.10 inch
2	0.11 inch
3	0.15 inch

Function Codes

Code 128 has four function codes (f1-f4). These special characters can be entered as:

- fixed characters when defining a code 128 field (Format Entry)
- data when printing a batch (Data Entry).

Enter the special 128 function codes as follows:

Press these keys	**to select this function code**
F2 then 1	f1
F2 then 2	f2
F2 then 3	f3
F2 then 4	f4

The function code is displayed as F_1, F_2, F_3, or F_4.

Table A-1. 128 Bar Code Character Sets

Any of the following characters can be used in online communication with the printer by sending the character's standard decimal value. To enter specific characters from the keyboard, refer to "Using the Keyboard" in section 1 of the *Operator's Handbook*.

Values listed on the chart are for reference only; they are not decimal values.

Value	Code A	Code B	Code C	Bar Pattern B	S	B	S	BS
0	S	SP	00	2	1	2	2	22
1	!	!	01	2	2	2	1	22
2	"	"	02	2	2	2	2	21
3	#	#	03	1	2	1	2	23
4	$	$	04	1	2	1	3	22
5	%	%	05	1	3	1	2	22
6	&	&	06	1	2	2	2	13
7	'	'	07	1	2	2	3	12
8	(	(	08	1	3	2	2	12
9	)	)	09	2	2	1	2	13
10	*	*	10	2	2	1	3	12
11	+	+	11	2	3	1	2	13
12	,	,	12	1	1	2	2	32
13	-	-	13	1	2	2	1	32
14	.	.	14	1	2	2	2	31
15	/	/	15	1	1	3	2	22
16	0	0	16	1	2	3	1	22
17	1	1	17	1	2	3	2	21
18	2	2	18	2	2	3	2	11
19	3	3	19	2	2	1	1	32
20	4	4	20	2	2	1	2	31
21	5	5	21	2	1	3	2	12
22	6	6	22	2	2	3	1	12

Value	Code A	Code B	Code C	Bar Pattern B	S	B	S	BS
23	7	7	23	3	1	2	1	31
24	8	8	24	3	1	1	2	22
25	9	9	25	3	2	1	1	22
26	:	:	26	3	2	1	2	21
27	;	;	27	3	1	2	2	12
28			28	3	2	2	1	12
29	=	=	29	3	2	2	2	11
30			30	2	1	2	1	23
31	?	?	31	2	1	2	3	21
32	@	@	32	2	3	2	1	21
33	A	A	33	1	1	1	3	23
34	B	B	34	1	3	1	1	23
35	C	C	35	1	3	1	3	21
36	D	D	36	1	1	2	3	13
37	E	E	37	1	3	2	1	13
38	F	F	38	1	3	2	3	11
39	G	G	39	2	1	1	3	13
40	H	H	40	2	3	1	1	13
41	I	I	41	2	3	1	3	11
42	J	J	42	1	1	2	1	33
43	K	K	43	1	1	2	3	31
44	L	L	44	1	3	2	1	31
45	M	M	45	1	1	3	1	23
46	N	N	46	1	1	3	3	21
47	O	O	47	1	3	3	1	21
48	P	P	48	3	1	3	1	21
49	Q	Q	49	2	1	1	3	31
50	R	R	50	2	3	1	1	31
51	S	S	51	2	1	3	1	13
52	T	T	52	2	1	3	3	11
53	U	U	53	2	1	3	1	31
54	V	V	54	3	1	1	1	23
55	W	W	55	3	1	1	3	21
56	X	X	56	3	3	1	1	21
57	Y	Y	57	3	1	2	1	13
58	Z	Z	58	3	1	2	3	11
59	[	[	59	3	3	2	1	11
60	\	\	60	3	1	4	1	11
61	]	]	61	2	2	1	4	11
62	^	^	62	4	3	1	1	11
63	_	_	63	1	1	1	2	24
64	NUL	'	64	1	1	1	4	2
65	SOH	a	65	1	2	1	1	24
66	STX	b	66	1	2	1	4	21

Value	Code A	Code B	Code C		Bar Pattern B	S	B	S	BS
67	ETX	c	67		1	4	1	1	22
68	EOT	d	68		1	4	1	2	21
69	ENQ	e	69		1	1	2	2	14
70	ACK	f	70		1	1	2	4	12
71	BEL	g	71		1	2	2	1	14
72	BS	h	72		1	2	2	4	11
73	HT	i	73		1	4	2	1	12
74	LF	j	74		1	4	2	2	11
75	VT	k	75		2	4	1	2	11
76	FF	l	76		2	2	1	1	14
77	CR	m	77		4	1	3	1	11
78	SO	n	78		2	4	1	1	12
79	SI	o	79		1	3	4	1	11
80	DLE	p	80		1	1	1	2	42
81	DC1	q	81		1	2	1	1	42
82	DC2	r	82		1	2	1	2	41
83	DC3	s	83		1	1	4	2	12
84	DC4	t	84		1	2	4	1	12
85	NAK	u	85		1	2	4	2	11
86	SYN	v	86		4	1	1	2	12
87	ETB	w	87		4	2	1	1	12
88	CAN	x	88		4	2	1	2	11
89	EM	y	89		2	1	2	1	41
90	SUB	z	90		2	1	4	1	21
91	ESC	{	91		4	1	2	1	21
92	FS	|	92		1	1	1	1	43
93	GS	}	93		1	1	1	3	41
94	RS	~	94		1	3	1	1	41
95	US	DEL	95		1	1	4	1	13
96	FNC3	FNC3	96		1	1	4	3	11
97	FNC2	FNC2	97		1	1	1	1	13
98	SHIFT	SHIFT	98		4	1	1	3	11
99	CODE C	CODE C	99		1	1	3	1	41
100	CODE B	FNC4	CODE B	1	1	4	1	3	1
101	FNC 4	CODE A	CODE A	3	1	1	1	4	1
102	FNC1	FNC1	FNC1		4	1	1	1	31
									–
				B	S	B	S	B	SB
	STOP			2	3	3	1	1	12

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